54Mbps Wireless LAN Card

User's Manual

Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of the seller.

The seller provides this documentation without warranty, term, or condition of any kind. The seller may make improvements or changes in the product(s) and/or the program(s) described in this documentation at any time.

Other product and company names herein may be trademarks of their respective owners.

© 2002 All rights reserved.

Rev: 01

January 2003

Contents

About This Manual ..... **V**

Chapter 1 Introduction **1**

Wireless LAN Basics 2
Local Area Network (LAN) *2*
Ad-Hoc Mode *3*
Infrastructure Mode *4*
Roaming *5*

Chapter 2 Installing the Wireless LAN Card **7**

System Requirements 8
Installing Wireless LAN Driver and Software 9

Chapter 3 Using WLAN Wireless Configuration Utility **17**

Accessing WLAN Wireless Configuration Utility 18
Notice When Assessing WLAN Utility under Windows XP *19*
Wireless Networks Tab 21
Connecting to an Available Wireless Network *21*
Configuring a New Wireless Network Connection *23*

Configuring an Existing Wireless Network Connection *26*
Specifying a Network Type to Access *27*
Link Status Tab 29
Statistics Tab 32
Site Monitor Tab 34
Advanced Site Monitor Tab *37*
Diagnostics Tab 40
Information Tab 43

Chapter 4 Using Wireless Tray Icon Functions 45

Viewing Signal Strength and Speed 45
Tray Icon Graphic Indication 46
Other Functions 47

Chapter 5 Windows XP Wireless Zero Configuration Utility 49

Connecting to an Access Point or Wireless LAN Card *49*
Viewing Wireless Connection Status *51*
Configuring Your Wireless Properties *52*

Chapter 6 Uninstalling the Wireless LAN Card 59

Uninstalling the Wireless LAN Card Software 59
Removing the Wireless LAN Card (For CardBus Adapter) 61

Chapter 7 Troubleshooting 63

Cannot Install under Windows 2000 63
Radio Interference 64

Card Not Detected 64
Cannot Connect to Another Wireless LAN Card 65
Poor Link Quality 65
Cannot Connect to Access Point 66

Appendix A Limited Warranty 67

Wireless LAN Hardware 67
Wireless LAN Software 68

Appendix B Regulatory Compliance 69

FCC Part 15 Declaration of Conformity (DoC) 69
FCC Rules and Regulations - Part 15 70
FCC Radiation Exposure Statement 71

Appendix C Setting Up TCP/IP 73

For Windows 98/ME 73
For Windows 2000/XP 75

Appendix D Specifications 77

Glossary 81

List of Figures

Figure 1-1 Ad-Hoc Mode 3
Figure 1-2 Infrastructure Mode 4
Figure 1-3 Roaming Across Multiple Access Points 5
Figure 1-1 Connecting to an Existing Wireless Network 22
Figure 1-2 Configuring a New Wireless Network Connection 23
Figure 1-3 Configuring an Existing Wireless Network Connection 26
Figure 1-4 Specifying a Network Type to Access 27
Figure 1-5 Specific Preferred Networks 28
Figure 1-6 Link Status Tab 31
Figure 1-7 Statistics Tab 33
Figure 1-8 Site Monitor Tab 36
Figure 1-9 Advanced Site Monitor Screen 39
Figure 1-10 Diagnostics Tab 42
Figure 1-11 Information Tab 43
Figure 3-12 Windows XP Configuration Utility-Connect to Wireless Network 50
Figure 3-13 Windows XP- Connection Status 52
Figure 3-14 Windows XP Connection Properties -General 53
Figure 3-15 Windows XP Connection Properties-Wireless Networks 54
Figure 3-16 Windows XP-Add Preferred Networks 55
Figure 3-17 Windows XP Configuration Utility-Set up Network to Aceess 57
Figure 3-18 Windows XP Connection Properties –Authentication 58

About This Manual

This manual was written for the following types of wireless adapter:

- 32-bit CardBus Adapter
- PCI Adapter
- Mini PCI Card

For brevity, throughout this manual **Wireless LAN Card** is used to indicate all the types. Also, the following terms/abbreviations are used interchangeably:

- Access Point – AP
- Peer-to-Peer – Ad Hoc
- Wireless LAN – WLAN
- Ethernet network – LAN – network

This User's Manual contains information on how to install and configure your Wireless LAN Card. From now on, we will guide you through the correct configuration steps to get your device up and run.

Chapter 1 Introduction

This Wireless LAN Card is an IEEE 802.11g wireless LAN adapter. 802.11g is the latest in the series of 802.11 specifications for wireless local area networks (WLANs) and provides data transfer of up to 54 Mbps. Since 802.11g operates on the same frequency of 2.4 GHz as 802.11b, so it is backwards compatible with existing Wi-Fi devices!

It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operating in 2.4GHz Direct Sequence Spread Spectrum (DSSS) radio transmission, the Wireless LAN Card transfers data at speeds up to 54Mbps. Both Ad-Hoc and Infrastructure mode are supported. For network security concern, 64/128-bit Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any 802.11b/g networks.

Wireless LAN Basics

This section conations some Wireless LAN basics to help you better understand how the product work together to create a wireless network.

Local Area Network (LAN)

Simply put, a LAN is a network that exists in a relatively limited area. A network is two or more computers connected together sharing files and peripheral devices such as printers.

The Wireless LAN Card allows you to interact with other computers without having to run cables normally associated with networks. This lets you move your computer around while staying connected to your network.

There are two ways to use the Wireless LAN Card. One way is to connect directly to one or more Wireless LAN Card equipped computers, forming an Ad-Hoc wireless network. The second way is to connect to an Access Point that gives you access to an existing wired LAN, forming an Infrastructure wireless network.

Ad-Hoc Mode

The Ad-Hoc Group offers peer-to-peer connections between workstations, allowing communication between computers within range that have an 802.11b DSSS compatible PC card installed. A wireless Ad-Hoc network can also access a wired LAN's TCP/IP service (such as e-mail and the Internet) by using a TCP/IP software router on an Ethernet equipped PowerBook or notebook.

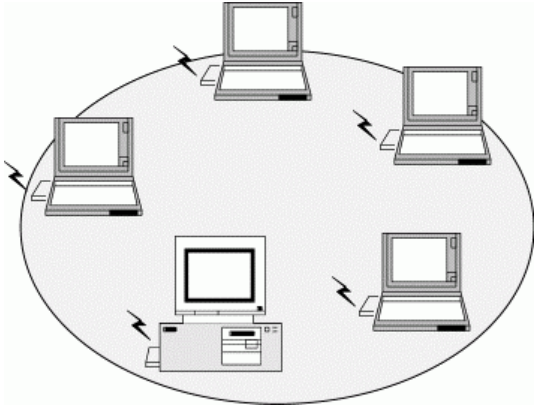


Figure 1-1 Ad-Hoc Mode

Infrastructure Mode

The Infrastructure network uses an AP or several APs as a gateway, linking the wireless network to a wired LAN. As a result, portable workstations or desktops on your wireless network have access to all of the features of your wired LAN including e-mail, Internet access, network printers and files server.

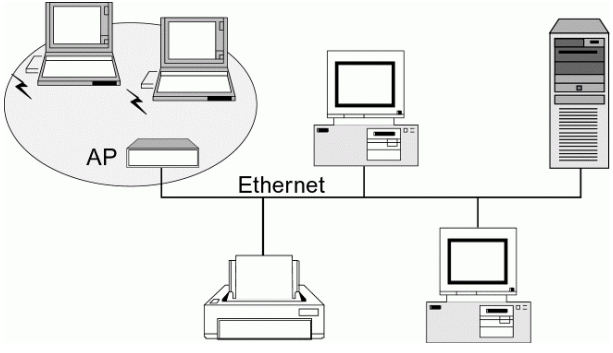


Figure 1-2 Infrastructure Mode

Roaming

Multiple Access Points can be installed to extend the wireless service coverage area for seamless wireless access. Within an extended service area, all Access Points and wireless clients must have the same Service Set Identity (SSID). Roaming among different Access Points is controlled automatically to maintain the wireless connectivity at all times.

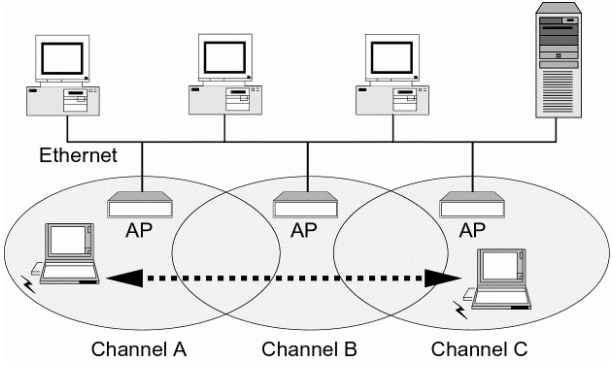


Figure 1-3 Roaming Across Multiple Access Points

Chapter 2 Installing the Wireless LAN Card

This chapter describes the installation process of the driver and software for the Wireless LAN Card. Proper driver installation is to allow the device to operate on your host computer while the utility software, WLAN Wireless Configuration Utility, is to help you configure and monitor your Wireless LAN Card.

If you are using an embedded wireless solution, such as the MiniPCI wireless adapter, your notebook is probably shipped with its driver and software properly installed. If this is the case, just ignore this chapter and proceed with the configuration steps in next chapter.

In case you need to install the driver and software for any reason, follow the instructions described in this chapter.

System Requirements

To use the Wireless LAN Card, your computer must meet the following minimum requirements:

- Pentium-class PC,300MHz or better recommended
- 64 MB of RAM, additional memory recommended
- Hard disk space at least 30 Mbytes
- Windows© 98(SE)/Me/2000/XP
- UL listed I.T.E. computers
- For CardBus wireless adapter: 32-bit Cardbus expansion slot
- For PCI wireless adapter: One available PCI slot

Installing Wireless LAN Driver and Software

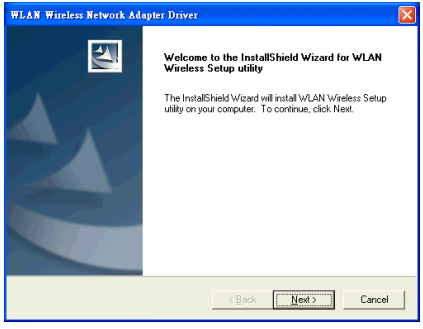
Follow these steps to install the Wireless LAN Card driver and software.

Cautions:
For CardBus adapter: Do not insert the wireless adapter to your computer before installing its driver. If this happens, the Windows PnP function will detect the wireless adapter and issue a dialog box requesting for its driver. Click **Cancel** to quit the wizard and remove the Wireless LAN Card from your computer.
For PCI/MiniPCI adapter: If your system has not been installed with the driver, the Windows PnP function will detect the wireless adapter and issue a dialog box requesting for its driver. Click **Cancel** to quit the wizard at this point.

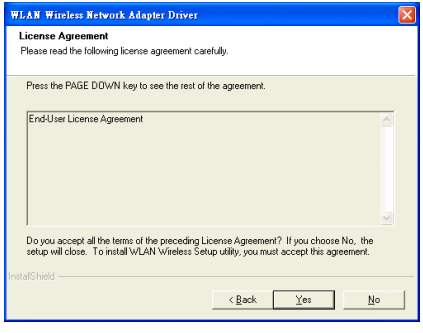
1. Close all Windows programs that are running.

2. Insert the provided Software Utility CD into your CD-ROM drive and select **Utility&Driver**. Or, run **Setup.exe** from **D**:**Utility&Driver** of the Software Utility CD where **D** is the drive letter.

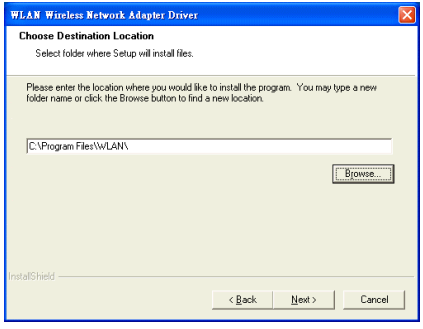
3. When the welcome screen pops up, click **Next**.


WLAN Wireless Network Adapter Driver
Welcome to the InstallShield Wizard for WLAN Wireless Setup utility
The InstallShield Wizard will install WLAN Wireless Setup utility on your computer. To continue, click Next.
< Back
Next >
Cancel

4. When the **License Agreement** screen appears, click **Yes**.

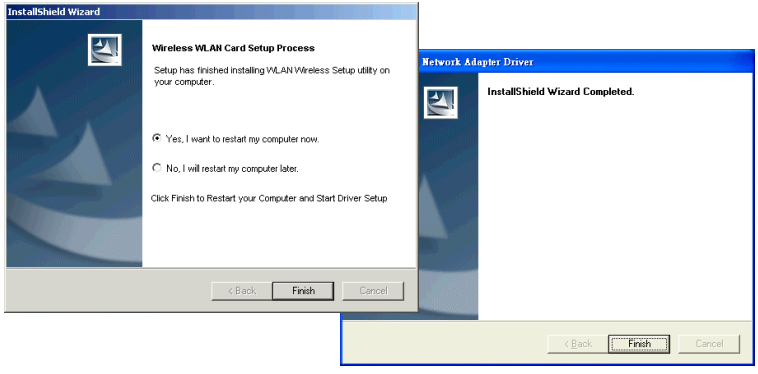

WLAN Wireless Network Adapter Driver
License Agreement
Please read the following license agreement carefully.
Press the PAGE DOWN key to see the rest of the agreement.
End-User License Agreement
Do you accept all the terms of the preceding License Agreement? If you choose No, the setup will close. To install WLAN Wireless Setup utility, you must accept this agreement.
InstallShield
< Back
Yes
No

5. To install the software to the default destination folder, click **Next**. If you are to install the software to a different folder, click **Browse** to select another folder, and then click **Next**.


WLAN Wireless Network Adapter Driver
Choose Destination Location
Select folder where Setup will install files.
Please enter the location where you would like to install the program. You may type a new folder name or click the Browse button to find a new location.
C:\Program Files\WLAN\
Browse...
InstallShield
< Back
Next >
Cancel

6. For CardBus wireless adapter only, the following screen will pop up asking you to insert your wireless adapter into the PCMCIA slot of your computer. Please do as the dialog request.

7. Click **Finish** when the following screen appears.


InstallShield Wizard
Wireless WLAN Card Setup Process
Setup has finished installing WLAN Wireless Setup utility on your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Click Finish to Restart your Computer and Start Driver Setup
< Back
Finish
Cancel
Network Adapter Driver
InstallShield Wizard Completed.
< Back
Finish
Cancel

Subject to your Windows OS, different situations will occur during or after the software installation. Follow these instructions to complete the installation.

For Windows 98(SE)

After reboot the Windows PnP wizard will appear as described below.

1. When **Add New Hardware Wizard** window appears, click **Next**.
2. Select **Search for the best driver for your device** and click **Next**.

3. Select **Specify a location**. Click **Browse** to specify the location of the driver (e.g., **C:\Program Files\WLAN\Driver**) and click **Next**.

4. Windows will find the driver file for the device. Click **Next**.

5. When prompted for Windows 98(SE) CD-ROM, click **OK**. Then enter the path to your Windows 98(SE) original files, and click **OK**.

   If Windows 98(SE) original files are not on your computer, you will need to remove the Software Installation CD and then insert your Windows 98(SE) installation CD. Otherwise just locate the Windows 98 CAB files on your computer.

6. Click **Finish**. If prompted to restart your PC, click **Yes**.

For Windows Me

After clicking **Finish** at step 5, the system will auto-reboot. After reboot the Windows PnP wizard will appear as described below.

1. When **Add New Hardware Wizard** window appears, select the **Specify the location of the driver** option and click **Next**.

2. Select **Search for the best driver for your device** and then check **only** the **Specify a location** box. Click **Browse** to specify the location of the driver (e.g., **C:\Program Files\WLAN\Driver**) and click **Next**.

3. Windows will find the driver file for the device. Click **Next**.

4. Click **Finish**. If prompted to restart your PC, click **Yes**.

For Windows 2000

If you are prompted with the **Digital Signature not Found** alarm message, just click **Yes** to continue with the installation. Then Windows PnP wizard will appear as described below.

1. When Windows displays the **Found New Hardware Wizard** window. Click **Next**

2. Select **Search for a suitable driver for my device** and click **Next**.

3. Check the **Specify a location** box and click **Next**.

4. Click **Browse** to specify the location of the driver (e.g., **C:\Program Files\WLAN\Driver**) and click **OK**.

5. Windows will find the driver file for the device. Click **Next**.

6. If **Digital Signature Not Found** window appears, click **Yes** to continue.

7. When the installing is complete, click **Finish**.

For Windows XP

1. If Windows logo compatibility message appears, click **Continue Anyway**.
2. When Windows OS pops up a dialog box requesting for driver, select **Install the software automatically** and click **Next**.
3. If Windows logo compatibility message appears again, click **Continue Anyway**.
4. Click **Finish**.

Now you are done with the installation procedure. After software installation, you should be able to find the wireless monitor icon located on the system tray. Your Wireless LAN Card is ready to use. Proceed to next chapter to configure or fine-tune your Wireless LAN Card settings.

Note: If you need to set up the TCP/IP address or the subnet mask, refer to "Appendix C Setting Up TCP/IP" for details.

Chapter 3 Using WLAN Wireless Configuration Utility

Once your wireless adapter software is properly installed, the provided **WLAN Wireless Configuration Utility** is ready for use. The utility comes with six tabs. The **Wireless Networks** tab allows to configure your wireless connection. The **Link Status** tab displays the current link status. The **Site Monitor** tab allows to monitor available networks. The **Diagnostic** tab allows to perform diagnostics. The utility information is displayed on the **Information** tab. The **Statistics** tab displays the statistics and status information pertaining to your Wireless LAN Card.

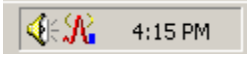
See the ensuing subsections for instructions to launch the utility and descriptions of each tab.

Note: If you are using Windows XP, you can also use the Windows XP-included wireless utility to configure and monitor your wireless network. For more information on using Windows wireless utility, please refer to "Chapter 5 Windows XP Wireless Zero Configuration Utility".

Accessing WLAN Wireless Configuration Utility

You can access the **WLAN Wireless Configuration Utility** by any of the following methods:

- Double-click the wireless monitor tray icon on the system tray and then click **Advanced**.



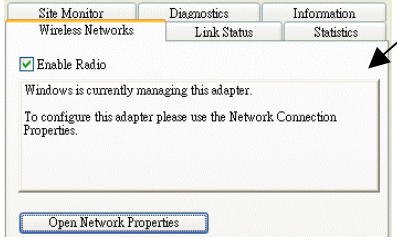
Note: If the icon is not displayed, select **Start** > **Programs** > **WLAN Wireless Utility** > **WLAN Wireless Utility**. Go to **Wirless Networks** tab and make sure that the **Show wireless icon in systray** checkbox is checked.

- Right-click the monitor tray icon and select **Open Utility** from its context menu.
- Under **Control Panel**, double-click the **WLAN Wireless Utility** icon.
- From Windows **Start** menu, select **Programs > WLAN Wireless Utility** > **WLAN Wireless Utility**.

The **WLAN Wireless Configuration Utility** screen pops up with six available tabs: **Wireless Network**, **Link Status**, **Statistics**, **Site Monitor**, **Diagnostics** and **Information**. Please see the appropriate section which describes each tab item.

Notice When Assessing WLAN Utility under Windows XP

Aside from using the manufacturer's **WLAN Wireless Configuration Utility** for wireless network configuration, Windows XP includes a **Wireless Zero Configuration Utility** for you to configure your wireless adapter. By default, your wireless adapter is managed by Windows XP-included wireless utility. Under this circumstances, you may find that you can not access the manufacturer's WLAN utility by double-clicking its tray icon or that the **Wireless Networks** tab is not editable in the manufacturer's WLAN utility.



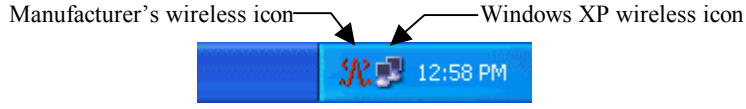
Wireless Networks tab is not editable when Windows XP overrides the management of your wireless adapter.

You can choose to configure your wireless network via either the **WLAN Wireless Configuration Utility** or Windows XP-included wireless utility.

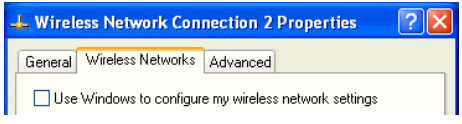
Using Manufacturer's WLAN Wireless Configuration Utility

To use **WLAN Wireless Configuration Utility** for configuration purpose, you should disable the Windows XP-included wireless utility by these steps:

1. Double-click the Windows XP wireless tray icon and then click **Advanced** (or **Properties**) > **Wireless Networks**.



2. On the **Wireless Networks** tab, uncheck the **Use Windows to configure my wireless network settings** box and click **OK**. This will restore the **Wireless Networks** tab in **WLAN Wireless Configuration Utility**.



Reverting back to Windows XP-included Wireless Utility

To revert back to using Windows XP-included wireless utility, double-click the Windows wireless icon (not the manufacturer's WLAN utility icon) and then click **Advanced** (or **Properties**). Click the **Wireless Networks** tab and check the **Use Windows to configure my wireless network settings** box and click **OK**.

Wireless Networks Tab

Wireless Networks tab allows to do the following task:

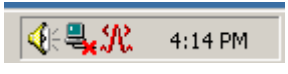
- Connecting to an Available Wireless Network
- Configuring a New Wireless Network Connection
- Specifying a Network Type to Access

See the appropriate subsection according to your need.

Connecting to an Available Wireless Network

To connect to an existing Access Point/Wireless LAN Card, take the following steps:

1. Double-click the wireless monitor icon in the system tray.



2. When the **Connect to Wireless Network** window pops up, you will see all the wireless networks available in the air. Under **Available networks**, select the wireless network you want to connect to.

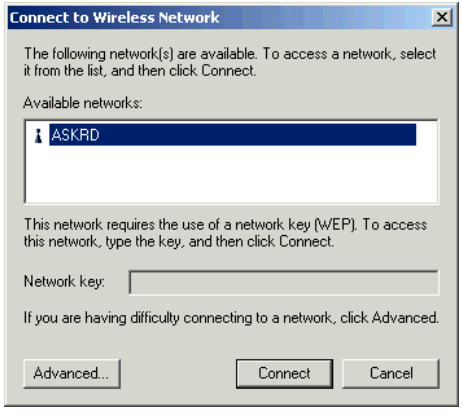
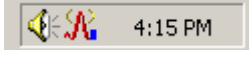

Connect to Wireless Network
The following network(s) are available. To access a network, select it from the list, and then click Connect.
Available networks:
ASKRD
This network requires the use of a network key (WEP). To access this network, type the key, and then click Connect.
Network key:
If you are having difficulty connecting to a network, click Advanced.
Advanced...
Connect
Cancel

Figure 1-1 Connecting to an Existing Wireless Network

3. If the target wireless network has been set with WEP key, you must enter the same WEP key in the **Network key** field. Otherwise, this field is dimmed and you do not need to set up the WEP key.

4. Click **Connect**, then you will join the target network and this dialog window will disappear. When your wireless connection is established, the connection icon may appear as below:



Configuring a New Wireless Network Connection

When you open the **Connect to Wireless Network** window, a network which does not broadcast its network name will not appear under **Available networks**. To connect to an existing network but not appear under **Available networks**, take the following steps:

1. In **Connect to Wireless Network** window, click **Advanced** to launch the **WLAN Wireless Configuration Utility** window. Then click **Add** under **Preferred networks** section.

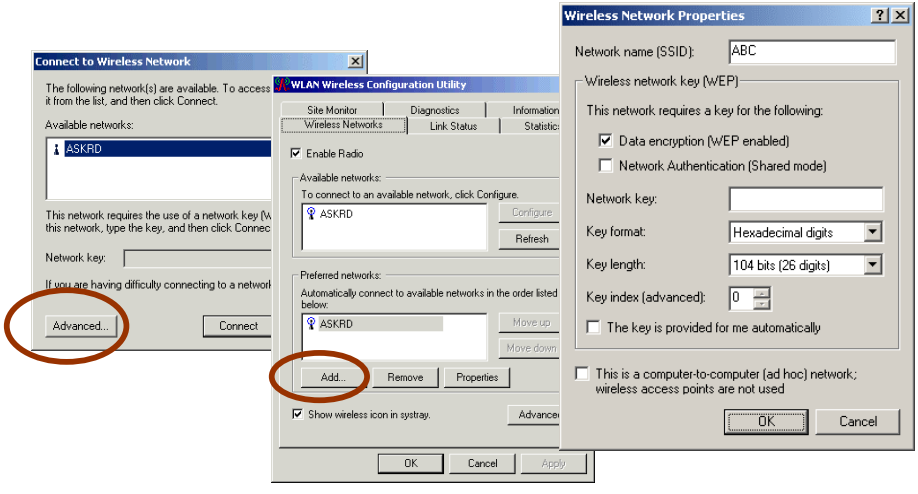


Figure 1-2 Configuring a New Wireless Network Connection

2. In the **Wireless Network Properties** window, configure the settings below:

Network name (SSID): Specifies the name of the Wireless LAN group you want to participate in.

Network Authentication (Shared mode): Specifies the authentication type. You should use the same setting as the other wireless stations in your target wireless network.

Wireless network key (WEP): If a network key is required, do the following:

- If the WEP key is automatically provided (for example, the key is stored on the wireless network adapter given to you by your network administrator), check **The key is provided for me automatically** check box.
- If the WEP key is not automatically provided for you, leave **The key is provided for me automatically** check box blank and then enter the key in the **Network key** field.

When entering the key, the **Key format** and **Key length** are changed automatically according to the format and length of the characters you entered. When using **Hexadecimal** format, only digits 0-9 and letters a-f, A-F are allowed. Make sure to enter the character matching the required key format and length as below:

	ASCII characters	Hexadecimal digits
40 bit	5 alphanumeric characters	10 hexadecimal digits
104 bit	13 alphanumeric characters	26 hexadecimal digits

Key index (advanced): Specifies the key index value (the location where a specific key is stored). You can specify up to four keys (the key index are 0, 1, 2 and 3).

Notes:

- Contact your network administrator or your target wireless client if you are unsure about the WEP setting.
- To use data encryption, all the wireless stations and/or Access Points must use the same encryption key values. For example, if you use Key #1 on your Wireless LAN Card and a value is assigned, then the same value must be assigned to Key 1 for all other client stations.

Ad Hoc/ Infrastructure Network: If the network you are configuring is an Ad Hoc network, check **This is a computer-to-computer (ad hoc) network…** check box. Otherwise leave it unchecked for Infrastructure network connection.

3. After entering required fields, click **OK** to exit this window.

Your newly configured network will be added under **Preferred networks**. Your wireless adapter will attempt to connect preferred networks in the order in which they appear in the list. You can change the order of preferred network by selecting the network that you want to move and clicking the **Move up** or **Move down** button.

Note that in the **Preferred networks** list, an Ad-hoc network can not be moved to a higher position than an Infrastructure network. If you want to connect to Ad Hoc network only, see "Specifying a Network Type to Access" for instructions.

Configuring an Existing Wireless Network Connection

On the **Wireless Networks** tab of **WLAN Wireless Configuration Utility**, if your target network appears under the **Available networks** or **Preferred networks** list but you cannot connect to it, you may want to review or reconfigure the settings. If this is the case, just select your target network and then click **Configure** (for **Available networks**) or **Properties** (for **Preferred networks**) to open the properties window. Then configure the settings as needed.

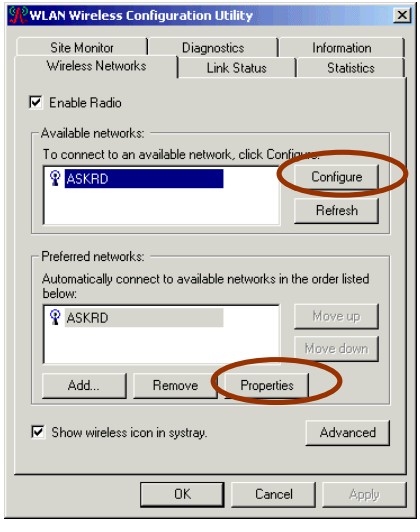


Figure 1-3 Configuring an Existing Wireless Network Connection

Specifying a Network Type to Access

By default, your wireless station will attempt to connect to an Infrastructure network (if available) first. If an Infrastructure network is not available, an Ad Hoc network will then be attempted.

However, it is possible that you want connect to certain networks only. In this situation, you can specify the network to access by clicking the **Advanced** button on the **Wireless Networks** tab. Then select your preferred access type and click **OK**.

For example, you want to connect to an Ad Hoc network but both Ad Hoc and Infrastructure networks are available. In this case, you can select the **Computer-to-computer (ad hoc) networks only** option.

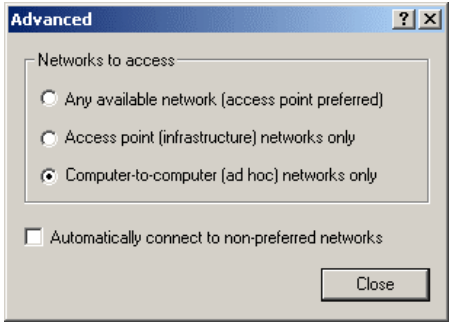
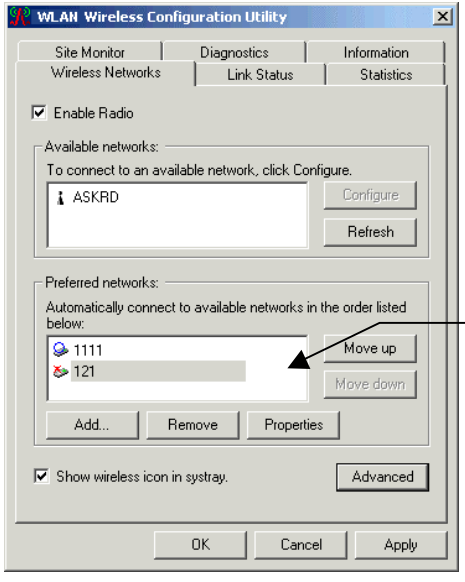


Figure 1-4 Specifying a Network Type to Access

Note that if your preferred network is limited to Access Point or Ad Hoc networks, the **Preferred networks** section on **Wireless Networks** tab will list only the networks of your preference. If you try to add a new network of non-preferred type, the addition will not appear in the list unless you change the preferred network types.



Only Ad Hoc networks are listed if your preferred network is limited to Ad Hoc networks.

Figure 1-5 Specific Preferred Networks

Link Status Tab

The **Link Status** tab contains general information about the connection and activity of your current link. The following table describes the items found on the **Link Status** screen.

Screen Item	Description
Status	Displays whether the card is associated with a network.
Network Name (SSID)	Displays the name of the wireless network your station is currently connected to.
AP's MAC Address	The MAC address of the associated AP.
Channel	The channel your wireless station is using.
WEP	Displays whether WEP is disabled or enabled in the current wireless network.
Speed	Displays the current packet transmit rate (Mbps).
Channel	Displays the channel the station is using.
Client IP Address	Displays the IP address of your wireless adapter.

Screen Item	Description
Network Connection Type	Displays if the adapter is connected to an Access Point or Ad Hoc network.
Radio State	Displays whether the RF Signal is enabled or disabled.
Signal	Displays the signal strength (dBm). On the right side, signal strength is indicated by graphic.
Noise	Displays the noise level (dBm). Noise level reflects the level of radio interference as measured at the Wireless LAN Card.

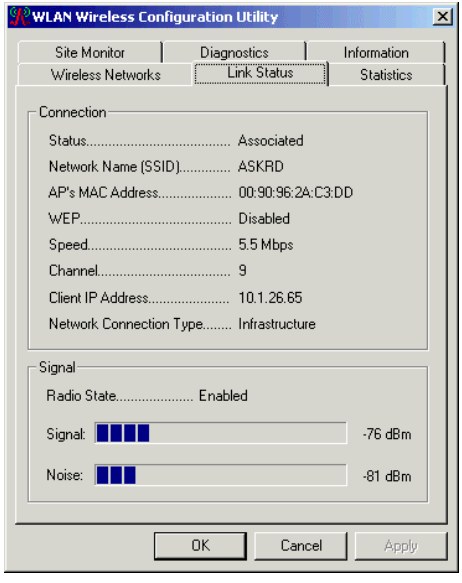


Figure 1-6 Link Status Tab

Statistics Tab

The **Statistics** tab displays the current and accumulated statistics information pertaining to your Wireless LAN Card. The following transmit and receive statistics are provided:

- Packets Sent
- Packets received
- Packets lost
- Total packets sent
- Total packets received

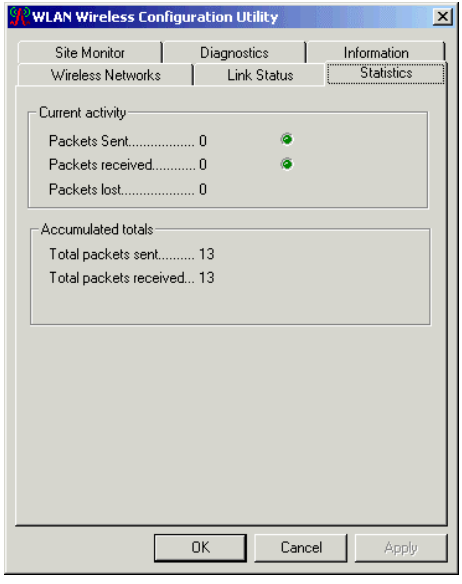


Figure 1-7 Statistics Tab

Site Monitor Tab

The **Site Monitor** tab displays the general information of the wireless networks available in the air. You can use the **Site Monitor** feature to display the communications quality of your computer with multiple Access Points in its vicinity. The **Site Monitor** allows you to conduct a site survey to:

- Determine the overall wireless coverage of your wireless network.
- Optimize placement of the Access Point(s), to provide seamless connectivity to mobile stations.
- Roam throughout the wireless network environment with your station, you will be able to identify areas that may not have adequate coverage, or that suffer from interference by other (wireless) equipment such as microwave ovens.

The **Visible Networks** list will update automatically to display all visible networks. Optionally you can click **Freeze** to temporarily stop the update of the list. To display only the Ad Hoc network, check the **Ad hoc networks only** checkbox.

For each network, the following information will be displayed:

Field	Description
Network Name (SSID)	Displays the name of the wireless network your station is currently connected to.

Field	Description
Channel	The channel your wireless station is using.
Signal Strength	Displays the signal strength (dBm).
WEP	Displays whether WEP is disabled/enabled.

For a selected network, the following information will be displayed:

Field	Description
Standard	The IEEE 802.11 wireless standard.
Supported Rates	The supported rates of the wireless network.

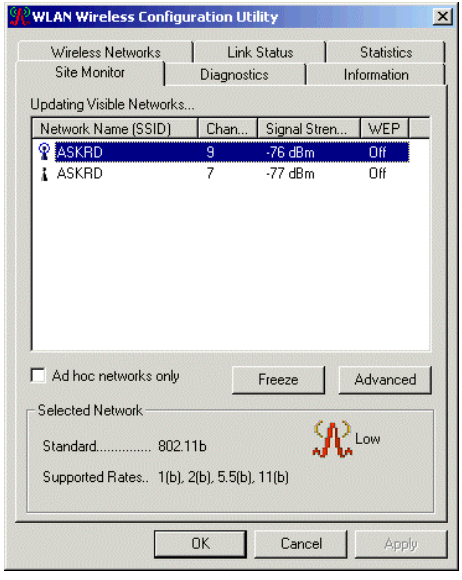


Figure 1-8 Site Monitor Tab

Advanced Site Monitor Tab

Clicking the **Advanced** button on the **Site Monitor** tab brings out the **Advanced Site Monitor** screen. The screen displays the following information in addition to those appear on the **Site Monitor** tab:

Field	Description
AP MAC	The MAC address for the wireless network interface of the Access Point.
Signal (dBm)	Signal level indicates the strength of the wireless signal as received at the Wireless LAN Card. Both dBm value and graphic indicator are displayed.
Noise (dBm)	Noise Level reflects the level of radio interference as measured at the Wireless LAN Card. Both dBm value and graphic indicator are displayed.
SNR (dBm)	The Signal-to-Noise Ratio (SNR) is the primary diagnostic counter to diagnose wireless performance. SNR indicates the relative strength of the received Signal Level compared to the Local Noise Level. In most environments, SNR is a good indicator for the quality of the

Field	Description
	radio link between transmitter and receiver. A higher SNR value means a better quality radio link. Both dBm value and graphic indicator are displayed.
Supported Data Rates	Displays the data rates supported by the Access Point.

You can sort the list of Access Points by clicking the field you want to use as a criteria.

You can also create log files based on the monitor measurements on the **Advanced Site Monitor** screen. To create a log file, click the **Start Log** button and specify the path and filename for the log file. Then the system will automatically append log entry to the file at regular intervals until you click the **Stop Log** button.

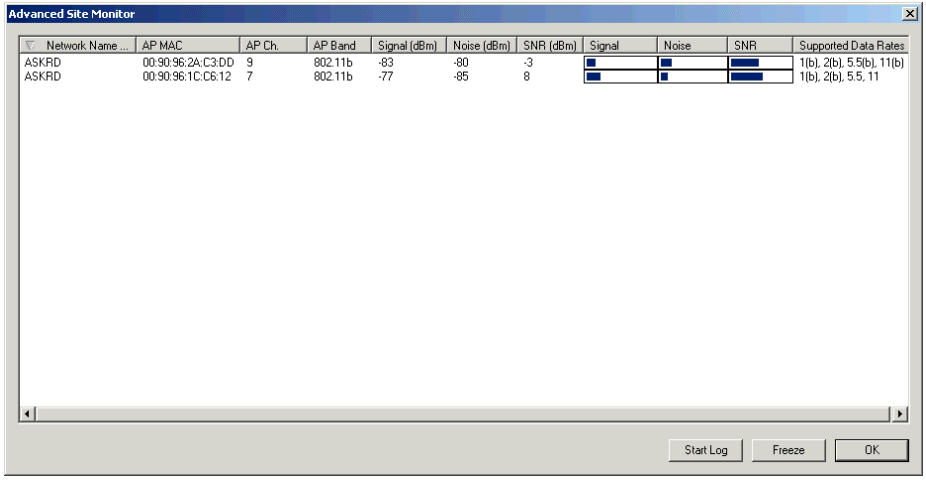


Figure 1-9 Advanced Site Monitor Screen

Diagnostics Tab

To perform a diagnostics, select the test you want to perform and then click **Run** and then click **OK** if prompted. Note that by running diagnostics your network connection will be temporarily interrupted. Connection will be resume after the completion of selected tasks. After the selected tasks are completed, the test result (**Passed** or **Failed**) will be displayed. You can select desired task to see detailed test information in the **Status** section.

The diagnostic allows to perform the following test:

Test Item	Description
Control Registers	This test verifies the read and write capabilities of the network controller registers by writing various values to the registers and verifying the result. The device driver uses these registers to perform network functions such as sending and receive information. If the test fails, the network adapter may not work properly.
SPROM Format Validation	This test verifies the content of the SPROM by reading a portion of the SPROM and computing the checksum. The test fails if the computed checksum is different than the checksum stored in the SPROM.
Memory Tests	This tests verifies that the network controller internal memory is functioning properly. The test writes patterned values to the

Test Item	Description
	memory and reading back the results. The test fails if an erroneous value is read back. The network controller will not function without its internal memory.
Interrupt Test	This tests verifies that the network controller internal memory is functioning properly. The test writes patterned values to the memory and reading back the results. The test fails if an erroneous value is read back. The network controller will not function without its internal memory.
Loopback Test	This test verifies that the NDIS driver is able to receive interrupts from the network controller.
LED Test	This test verifies that your 802.11 wireless networking hardware is functioning correctly. This test is applicable to PC Card only.

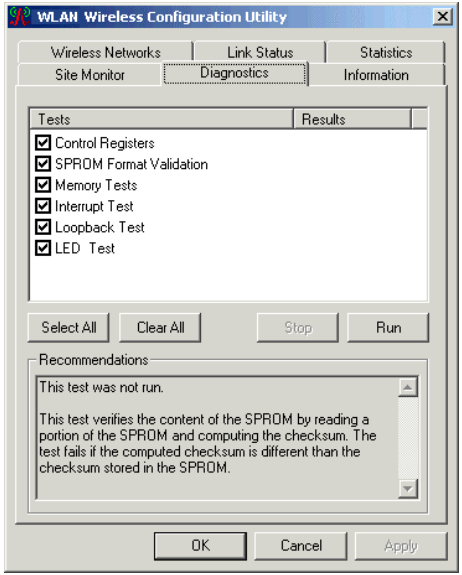


Figure 1-10 Diagnostics Tab

Information Tab

The **Information** tab displays the basic information about the device, including the hardware and software details.

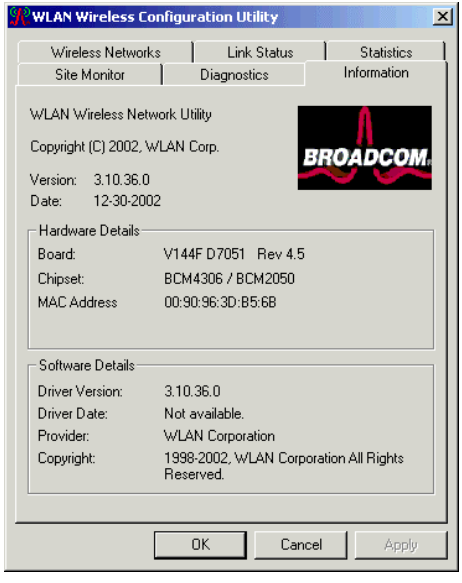


Figure 1-11 Information Tab

Chapter 4 Using Wireless Tray Icon Functions

Viewing Signal Strength and Speed

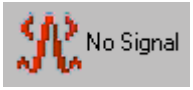
Whenever you start Windows, you should be able to find the wireless monitor icon loaded in the system tray, located near the clock on the task bar.

While connected, you can place your cursor over the icon to see the pop-up text that gives link information about the current SSID, speed and signal strength.

Tray Icon Graphic Indication

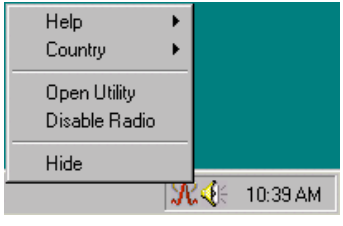
The graphic of the wireless icon changes to indicate your wireless connection quality. Possible radio connection quality and procedures to take are described in the table below:

Graphic	Radio Connection Quality
	Very good radio connection Your Wireless LAN Card has an excellent radio connection with the network, allowing excellent network communication at the highest transmit rate.
	Good radio connection Your Wireless LAN Card has a good radio connection with the network, allowing normal network communication.
	Low radio connection The radio signal is low. You can move your device closer to your target Access Point or wireless station for better signal strength.
	Poor radio connection. The radio signal is very weak. You can move your device closer to your target Access Point or wireless station for better signal strength.

Graphic	Radio Connection Quality
	No radio connection It may due to you are out of range of the wireless network, you manually disable the RF signal or configuration errors (such as the SSID or WEP encryption doesn't match your target Access Point/wireless station). Move your device closer to your target Access Point/wireless station or verify your SSID or WEP settings.

Other Functions

Right-clicking the icon displays the context menu as shown below:



Each item on the context menu is described as below:

Help > About: Displays the wireless monitor tray applet information.

Country: Allows users to switch to different country codes.

Open Utility: Pops up the **WLAN Wireless Configuration Utility**.

Enable/Disable Radio: Enable or disable the RF signal.

Hide: Hides the wireless system tray icon. To re-display the icon, select **Start** > **Programs > WLAN Wireless Utility** > **WLAN Wireless Utility**. Go to the **Wireless Networks** tab and check the **Show wireless icon in systray** checkbox.

Chapter 5 Windows XP Wireless Zero Configuration Utility

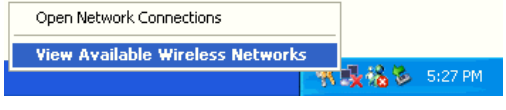
Windows XP provides built-in **Wireless Zero Configuration** utility for wireless configuration and monitoring. You can choose to configure your wireless network via either the **Wireless Client Manager** as described in preceding section, or to use the Windows XP **Wireless Zero Configuration** utility.

This section only provides the essential instructions on using Windows XP wireless utility to get your wireless network established. For more information please refer to Windows XP on-line help.

Connecting to an Access Point or Wireless LAN Card

To connect to an existing Access Point/Wireless LAN Card, take out the following steps:

1. Right-click the **Wireless Connection** icon on the system tray and select **View Available Wireless Networks** from the context menu.



Note: Depending on whether your wireless network is established, the context menu may come with different items.

2. When the **Connect to Wireless Network** window pops up, you will see all the Access Points or Wireless LAN Cards that are available in the air. Select the wireless network you want to connect to .

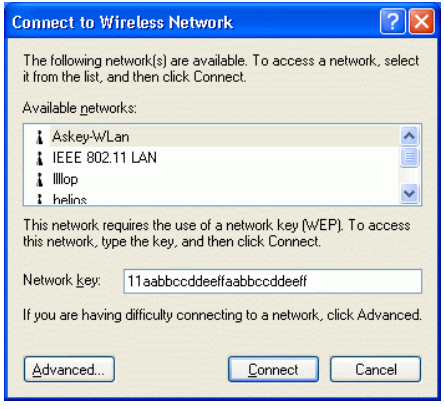
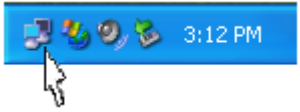

Connect to Wireless Network
The following network(s) are available. To access a network, select it from the list, and then click Connect.
Available networks:
Askey-WLan
IEEE 802.11 LAN
lllllop
helios
This network requires the use of a network key (WEP). To access this network, type the key, and then click Connect.
Network key:
11aabbccddeeffaabbccddeeff
If you are having difficulty connecting to a network, click Advanced.
Advanced...
Connect
Cancel

Figure 3-12 Windows XP Configuration Utility-Connect to Wireless Network

3. If the target Access Point/Wireless LAN Card has been set with WEP key, you must enter the same WEP key in the **Network key** field. Otherwise, leave it blank.

4. Click **Connect**, then you will join the target network and this dialog window will disappear. When your wireless connection is established, the connection icon appears as below:



Note: If the wireless connection can't be established, double-click the connection icon and then click **Properties**. Go to **Authentication** tab first to make sure that you use the correct authentication type for the Wireless LAN Card. For more information, refer to "Authentication" on page 57.

Viewing Wireless Connection Status

After you successfully connect to the Access Point or Wireless LAN Card, double-click the icon in the system tray again. This will open the **Wireless Network Connection Status** window where you can see the general data of the Wireless LAN Card, such as Status, Duration, Speed, Signal Strength, etc.

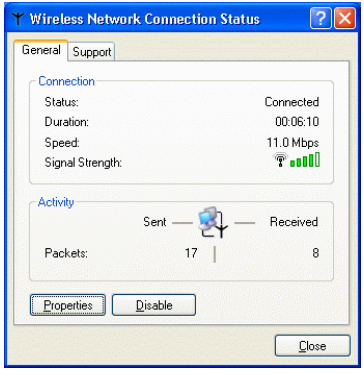


Figure 3-13 Windows XP- Connection Status

Configuring Your Wireless Properties

To configure your wireless properties, open the **Wireless Network Connection Status** window as described above, and then click the **Properties** button. This will open the **Wireless Network Connection Properties** window which allows you to configure more detailed items of the Wireless LAN Card. The following describes each tab of the properties window to help you do more settings of the Wireless LAN Card.

General

This tab allows you to specify the network methods to be used with your Wireless LAN Card. The network policy depends on your wireless network. For TCP/IP protocol, you should configure its properties as instructed by your network administrator. For more information on TCP/IP setting, please refer to “Appendix C Setting Up TCP/IP” on page 73.

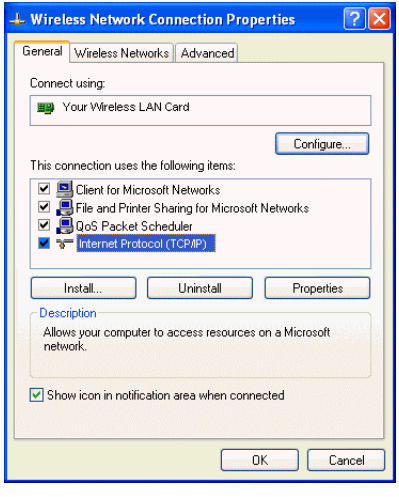


Figure 3-14 Windows XP Connection Properties -General

Wireless Networks

This tab contains two sections: **Available networks** and **Preferred networks** described as below.

Under **Available networks** section, you can also see all the Access Points and Wireless LAN Cards available in the air. Clicking **Refresh** will update the list of Access Points and Wireless LAN Cards.

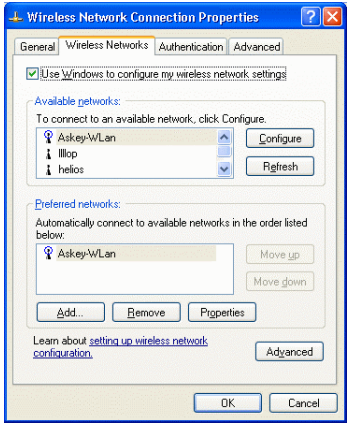


Figure 3-15 Windows XP Connection Properties-Wireless Networks

Under **Preferred networks** section, you can add any wireless networks that you wish to connect to. To do this, just click **Add** to add more Access Points or Wireless LAN Cards to the list.

After you click the **Add** button, the **Wireless Network Properties** window pops up. Type your network name (SSID) and, if needed, the wireless network WEP settings. Once the Access Point or Wireless LAN Card that you want to connect to has been set with WEP key, you must type the same WEP key as the Access Point's or Wireless LAN Card's.

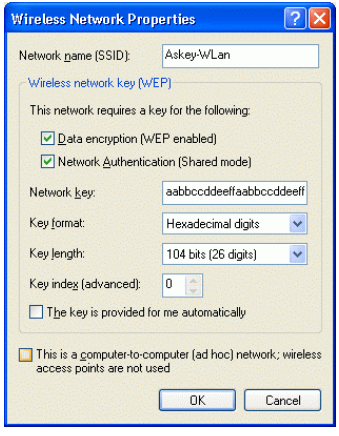


Figure 3-16 Windows XP-Add Preferred Networks

After you add several profiles into **Preferred networks,** you can change the order in which connection attempts to preferred networks are made. Just select the target wireless network and click **Move up** or **Move down** to move it to a desired position.

To Access Certain Wireless Network Only

If you just want to access certain wireless network type, click the **Advanced** button on the **Wireless Networks** tab to open the **Advanced** window. You can choose to connect to the following networks:

- Any available network (access point preferred)
- Access point (infrastructure)
- Computer-to-computer (Peer-to-Peer Group)

The default network type is **Any available network (access point preferred)**. In this network type, your device will connect to any Access Points or Wireless LAN Cards available in the air but Access Point always demands higher connection attempt priority.

Once you finish the advanced setting, your wireless station will then connect to your desired network and the connected network will be listed under **Available networks**.

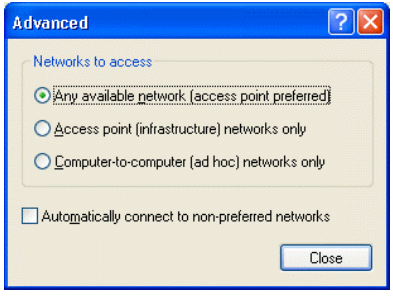
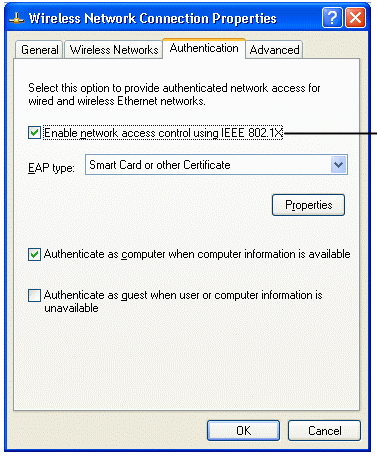


Figure 3-17 Windows XP Configuration Utility-Set up Network to Aceess

Authentication

This tab allows you to configure the authentication settings of your Wireless LAN Card. The most important setting for the Wireless LAN Card is to disable **Enable network access control using IEEE802.1X** to ensure successful connection between the Wireless LAN Cards and Access Points or other Wireless LAN Cards. You must disable this function for any reason. Otherwise, there may be some problems happening during connection. For other settings, we recommend you keep the default settings to minimize the problems during connection.


Wireless Network Connection Properties
General
Wireless Networks
Authentication
Advanced
Select this option to provide authenticated network access for wired and wireless Ethernet networks.
Enable network access control using IEEE 802.1X
EAP type:
Smart Card or other Certificate
Properties
Authenticate as computer when computer information is available
Authenticate as guest when user or computer information is unavailable
OK
Cancel

Make sure to clear the **Enable network access control using IEEE802.1X** check box to ensure successful connection.

Figure 3-18 Windows XP Connection Properties –Authentication

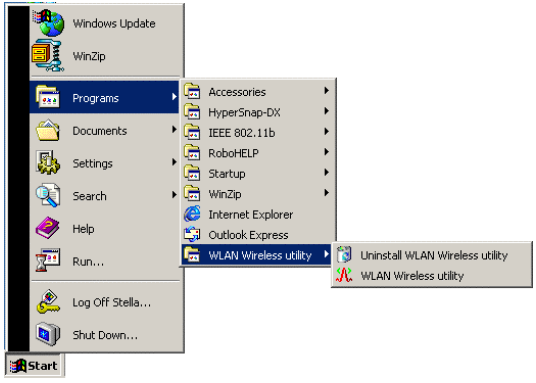
Chapter 6 Uninstalling the Wireless LAN Card

Should you need to uninstall the Wireless LAN Card and application software for any reason,, you should uninstall the associated software and then remove the hardware from your computer. Please proceed as follows.

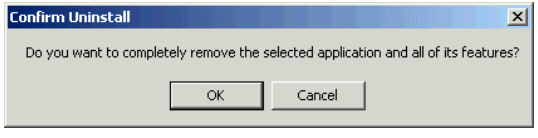
Uninstalling the Wireless LAN Card Software

Note: Before uninstalling the Wireless LAN Card software, please disable the utility by right-clicking the utility tray icon and select **Hide** from the context menu. The icon will disappear to indicate that the utility is not in operation.

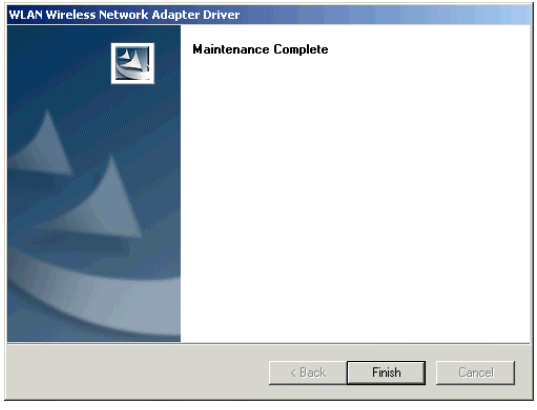
1. Close all programs that are currently running.
2. Click the Windows **Start** button, point to **Programs**, **WLAN Wireless Utility** and then click **Uninstall WLAN Wireless Utility**.



3. Click **OK** to proceed with the software removal procedure.



4. Click **Finish** to complete the software uninstallation.



Removing the Wireless LAN Card (For CardBus Adapter)

To permanently remove the CardBus adapter from your computer, make sure that you have removed the software before you proceed to remove the hardware.

The Wireless LAN Card complies with the PCMCIA standard that allows devices to be inserted into and removed from the computer's PCMCIA slot when the computer is powered on. For a PCMCIA device, it is recommended that you follow the standard Windows procedure for disconnecting a PCMCIA device from your computer. The following steps assume a Windows 98 environment:

1. On the system tray, right-click the PCMCIA icon, and then click **Adjust PC Card Properties**.

2. Select the Wireless LAN Card which you want to remove, click **Stop**.

3. When the message appears that tells you it is safe to remove device, click **OK** and remove the Wireless LAN Card from the computer.

4. Click **OK** to exit the **PC Card (PCMCIA) Properties** window.

Chapter 7 Troubleshooting

Cannot Install under Windows 2000

When I installing the software under Windows 2000, I received the error message: “1608: Unable to create InstallDriver instance” and the program stopped installing.

This error occurs when the **Microsoft Network Client** is not installed under Windows 2000. To install this network component:

1. Go to **Control Panel** and double-click the **Network and Dial-up Connections** icon. Right-click on the **Local Area Connection**, then select **Properties**.
2. Click **Install** > **Client** > **Add** > **Client for Microsoft Networks** > **OK**.
3. The **Microsoft Network Client** is now installed. Manually restart your computer to enable the changes.
4. Then re-try to install the software as described in this manual.

Radio Interference

You may be able to eliminate any interference by trying the following:

- Reseat the Wireless LAN Card.
- Increase the distance between the wireless computers and the device causing the radio interference.
- Plug the computer equipped with the Wireless LAN Card into an outlet on a different branch circuit from that used by the affecting device.
- Consult the dealer or an experienced radio technician for help.
- Keep the computer with the Wireless LAN Card away from the microwave oven and large metal objects.

Card Not Detected

If the Wireless LAN Card is not detected by Windows, try the following:

- Make sure the Wireless LAN Card is properly inserted in the computer.
- For PC Card, make sure the slot in your computer is working.
- Contact your dealer for additional testing if there is a hardware problem with the Wireless LAN Card.

Cannot Connect to Another Wireless LAN Card

If you cannot make a connection to another Wireless LAN Card from your computer, it could be due to one of the following reasons:

- Incorrect SSID. Make sure the SSID is the same for all computers that have a Wireless LAN Card.
- Changes are not being recognized by your computer. Restart your computer.
- If in Ad-Hoc mode, make sure the **Log on to Windows NT domain** check box is not selected in the **Client for Microsoft Networks Properties** dialog box in the **Network Configuration** tab.
- Incorrect IP Address or Subnet Mask. Check these settings in the **TCP/IP Properties** dialog box in the **Network Configuration** tab.

Poor Link Quality

If the Link Quality display stays in the Poor range, it could be due to one of the following reasons:

- Radio interference.
- Distance between Wireless LAN Card and Access Point is too far. Decrease the distance between the Wireless LAN Card and Access Point (or another card).

Cannot Connect to Access Point

If you cannot make a connection to the Access Point, it could be due to one of the following reasons:

- Make sure the Wireless LAN Card and Access Point have no physical connection problems.
- Make sure the SSID for the Wireless LAN Card is the same as the Access Point.
- Make sure the privacy type is the same as that of Access Point. Also, make sure the Default Key is the same for both computers.

Appendix A Limited Warranty

Wireless LAN Hardware

The seller warrants to the end user ("Customer") that this hardware product will be free from defects in workmanship and materials, under normal use and service, for 1 year from the date of purchase from the seller or its authorized reseller. The seller's sole obligation under this express warranty shall be, at the seller's option and expense, to repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or if neither of the two foregoing options is reasonably available, The seller may, in its sole discretion, refund to the Customer the purchase price paid for the defective product. All products that are replaced will become the property of the seller. Replacement products may be new or reconditioned.

Wireless LAN Software

The seller warrants to Customer that each software program licensed from it , except as noted below, will perform in substantial conformance to its program specifications, for a period of 1 year from the date of purchase from the seller or its authorized reseller. The seller warrants the media containing software against failure during the warranty period. No updates are provided. The seller's sole obligation under this express warranty shall be, at the seller's option and expense, to refund the purchase price paid by Customer for any defective software product, or to replace any defective media with software which substantially conforms to applicable seller published specifications. Customer assumes responsibility for the selection of the appropriate application programs and associated reference materials. The seller makes no warranty or representation that its software products will meet Customer's requirements or work in combination with any hardware or software applications products provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected. For any third party products listed in the seller software product documentation or specifications as being compatible, the seller will make reasonable efforts to provide compatibility, except where the non-compatibility is caused by a defect in the third party's product or from use of the software product not in accordance with the seller's published specifications or user manual.

Appendix B Regulatory Compliance

FCC Part 15 Declaration of Conformity (DoC)

The following equipment:

Product Name: Wireless LAN Card

is herewith confirmed to comply with the requirements of FCC Part 15 rules. The operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Rules and Regulations - Part 15

Warning: This device has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the Federal Communications Commissions Rules and Regulation. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Relocate your WLAN equipped laptop computer.
- Increase the separation between the WLAN equipped laptop computer and other electronics.
- Connect the WLAN equipped laptop computer into an outlet on a circuit different from that of other electronics.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

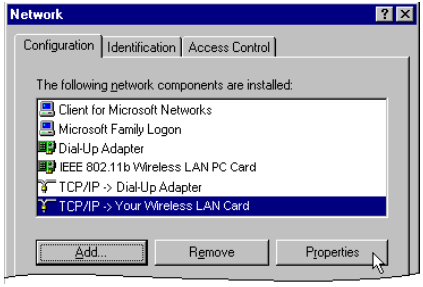
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20cm between the radiator & your body.

Appendix C Setting Up TCP/IP

This section contains instructions for configuring the TCP/IP protocol of the Wireless LAN Card. The IP address policy depends on your wireless network. You should configure your TCP/IP protocol as instructed by your network administrator.

For Windows 98/ME

1. Double-click the **Network** icon on the **Control Panel**.
2. Click the **Configuration** tab of the **Network** dialog box.
3. In the network components list, select the TCP/IP protocol of your Wireless LAN Card, e.g., **TCP/IP ->Broadcom 802.11b Network Adapter** and then click **Properties**.



4. On the **IP Address** tab, choose one of the methods as required:

   Option A: Click **Specify an IP address**.

   In the **IP Address** box, enter a valid four-component IP address, either a public or private one as required.

   In the **Subnet Mask** box, enter a valid four-component IP address.

   Then select the **Gateway** tab and enter your gateway information.

   Option B: Select **Obtain an IP address automatically**.

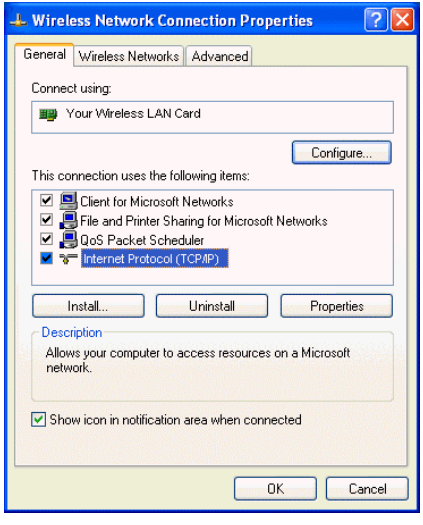
   Then an IP address will be automatically assigned to your computer.

5. Click **OK** to return to **Network** dialog box and click **OK** again to finish configuration. If your TCP/IP properties have been modified, you will be prompted to restart your computer. Click **Yes** to have new settings take effect.

For Windows 2000/XP

1. Double-click **Network Dial-up Connections** (Windows 2000) or **Network Connections** (Windows XP) on **Control Panel**.

2. Right-click the **Local Area Connection** icon corresponding to your wireless adapter (e.g., **Broadcom 802.11b Network Adapter**) and click **Properties**.



3. On the **General** tab, highlight **Internet Protocol (TCP/IP)** and then click **Properties**.

   Option A: Use fixed IP address.

   Enable the **Use the following IP Address** option. Enter the **IP address**, **Subnet Mask** and **Default gateway**. Then click **OK**.

   Option B: Use dynamic IP address

   Select **Obtain an IP address automatically**.

4. Close the **Local Area Connection Properties** window. For Windows 2000, if prompted, click **Yes** to restart your computer.

Appendix D Specifications

Host Interfaces	Mini PCI / CardBus / PCI Spec. V2.2
Form factor	Type III B / 32bit CardBus / Low profile PCI
Chipset	Broadcom BCM 4306 & BCM 2050
Operation Voltage	3.3VDC
Network Standards	IEEE 802.11b (Wi-Fi™) standard and IEEE 802.11g draft standard (54G)
Modulation Techniques	DBPSK,DQPSK,CCK,16QAM,64QAM
Modulation Technology	OFDM,DSSS
Data Rate	802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps
Network Architectures	Infrastructure and Ad Hoc
Operating Frequencies	2.4-2.497 GHz

Operating Channels	802.11b: 11 for North America, 14 for Japan, 13 for Europe (ETSI) 802.11g: 13 for North America, 13 for Europe (ETSI), 13 for Japan
RF Output Power	15 dBm maximum output power (14 dBm nominal ± 1 dBm over operating temperature
Receiver sensitivity **(PER <10%)**	-80dBm @ 6Mbps
Antenna Type	Hardware diversity support: transmit and receive on Main and Auxiliary antenna connectors.
Range	802.11b: 11 Mbps up to 180m LOS, 60m indoors; 1 Mbps up to 570m LOS, 125m indoors 802.11g: 54 Mbps up to 50m LOS, 20m indoors; 18 Mbps up to 150m LOS, 75m indoors
Power Consumption	Tx peak: 550 ma @ 3.3VDC; Rx peak: 350 ma @ 3.3VDC; Idle: 225mA @ 3.3VDC
Security	Hardware 64/128-bit WEP engine; WEP weak-key avoidance, TKIP, hardware AES engine supporting CCM and OCB, 802.1x, SSN
Delay Tolerance	802.11b: Multipath R.M.S Delay Spread @ 1% FER: 11 Mbps > 250 nsec; 5.5 Mbps > 300 nsec

Client Utility	Automatic location profile, site monitor, current link status, and diagnostics
Software Support	Microsoft WHQL certified for Windows XP, 2000, and ME. Linux and VxWorks embedded drivers.
LED Indicators	WLAN Activity Monitor, WLAN Radio Status Indicators
Switch	Manual radio on/off disables transmit and receive to comply with aviation in-flight restrictions
Temperatures	Operates from 0 to 70 ℃ Storage from -40 to 90 ℃
Humidity (non-condensing)	5 to 95%
Certifications	Wi-Fi; FCC part 15C/15.247; ETS 300 328-2; UL; IEC60950; EN 301 489-1,17; prEN50371;CE Mark; TELEC

* Specifications are subject to change with notice.

Glossary

10BaseT An IEEE standard (802.3) for operating 10 Mbps Ethernet networks (LANs) with twisted pair cabling and a wiring hub.

Access Point An internetworking device that seamlessly connects wired and wireless networks. Access Points combined with a distributed system support the creation of multiple radio cells that enable roaming throughout a facility.

Ad-Hoc A network composed solely of stations within mutual communication range of each other (no Access Point connected).

BSS *Basic Service Se*t. A set of stations controlled by a single coordination function.

Channel A medium used to pass protocol data units that can be used simultaneously in the same volume of space by other channels of the same physical layer, with an acceptably low frame error ratio due to mutual interference.

Encapsulated An Ethernet address mode that treats the entire Ethernet packet as a whole and places it inside an 802.11 frame along with a new header.

ESS *Extended Service Se*t. A set of one or more interconnected Basic Service Sets (BSSs) and integrated Local Area Networks (LANs) can be configured as an Extended Service Set.

Ethernet The most widely used medium access method, which is defined by the IEEE 802.3 standard. Ethernet is normally a shared media LAN; i.e., all the devices on the network segment share total bandwidth. Ethernet networks operate at 10Mbps using CSMA/CD to run over 10BaseT cables.

Gateway A network component that acts as an entrance to another network.

IEEE 802.11 The IEEE 802.xx is a set of specifications for LANs from the Institute of Electrical and Electronic Engineers (IEEE). Most wired networks conform to 802.3, the specification for CSMA/CD-based Ethernet networks or 802.5, the specification for token ring networks. 802.11 defines the standard for wireless LANs encompassing three incompatible (non-interoperable) technologies: Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS), and Infrared. IEEE standards ensure interoperability between systems of the same type.

Infrastructure A wireless network centered about an Access Point. In this environment, the Access Point not only provides communication with the wired network but also mediates wireless network traffic in the immediate neighborhood.

IP *Internet Protocol*. The standard protocol within TCP/IP that defines the basic unit of information passed across an Internet connection by breaking down data messages into packets, routing and transporting the packets over network connections, then reassembling the packets at their destination. IP corresponds to the network layer in the ISO/OSI model.

IP Address An IP address is a 32-bit number that identifies each sender or receiver of information sent across the Internet. An IP address has two parts: the identifier of a particular network on the Internet and an identifier of the particular device (which can be a server or a workstation) within that network.

ISP *Internet Service Provide*r. An organization that provides access to the Internet. Small ISPs provide service via modem and ISDN while the larger ones also offer private line hookups (T1, fractional T1, etc.).

LAN *Local Area Networ*k. A communications network that serves users within a defined geographical area. The benefits include the sharing of Internet access, files, and equipment, such as printers and storage devices. Special network cabling (10BaseT) is often used to connect the PCs together.

NAT *Network Address Translatio*n. The translation of an Internet Protocol address (IP address) used within one network to a different IP address known within another network. One network is designated the internal network and the other is the external. The internal network then appears as one entity to the outside world.

Radio Frequency *R*F, Terms: GHz, MHz, Hz —The international unit for measuring frequency is Hertz (Hz), equivalent to the older unit of cycles per second. One megahertz (MHz) is one Million-Hertz. One giga hertz (GHz) is one Billion-Hertz. The standard U.S. electrical power frequency is 60 Hz, the AM broadcast radio frequency band is 0.55–1.6 MHz, the FM broadcast radio frequency band is 88–108 MHz, and wireless 802.11 LANs operate at 2.4GHz.

SSID *Service Set I*D. A group name shared by every member of a wireless network. Only client PCs with the same SSID are allowed to establish a connection.

Subnet Mask A value that defines whether your computer communicates only within your LAN or communicates outside of your LAN, where it is routed out to the rest of the Internet. A Subnet Mask that has the same first three components (for example, 255.255.255.0) is the routing pattern for a Class C address.

TCP *Transmission Control Protoco*l. The standard transport level protocol that provides the full duplex, stream service on which many applications' protocols depend. TCP allows a process on one machine to send a stream of data to a process on another. Software implementing TCP usually resides in the operating system and uses the IP to transmit information across the network.

WEP *Wired Equivalent Privac*y. The optional cryptographic confidentiality algorithm specified by 802.11. The algorithm is being used to provide data confidentiality that is subjectively equivalent to the confidentiality of a wired LAN medium that does not employ cryptographic techniques to enhance privacy..